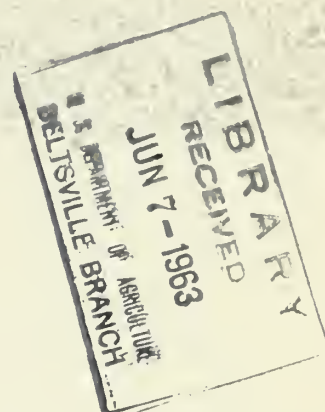


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# Infectious Sinusitis of Turkeys and its control

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## PREFACE

Infectious sinusitis, also known as swellhead or air-sac infection, is a respiratory disease of turkeys. It is characterized by an inflammation of the membranes lining the infraorbital sinuses. Later the sinuses become distended with a clear to milky semigelatinous exudate. Involvement of the lower respiratory tract resulting in "airsacculitis" is also seen. In fact, the air sacs are the most frequent sites of infection.

Infectious sinusitis is of greatest importance in the United States and Canada, but is also known to exist in Australia and Great Britain.

In a recent study, it was evident that practical information about infectious sinusitis in turkeys was lacking. This publication is issued to provide an up-to-date description of the disease and control measures to veterinarians, turkey hatcherymen, and flock owners.

Grateful acknowledgment is made to Dr. Claude Pfow, ADE Poultry Epidemiologist, St. Paul, Minn., for his preparation of the material contained in this publication.

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# INFECTIOUS SINUSITIS OF TURKEYS AND ITS CONTROL

Infectious sinusitis, also known as swell head or air-sac infection, is a respiratory disease of turkeys. It is characterized by an inflammation of the membranes lining the infraorbital sinuses. Later the sinuses become distended with a clear to milky semigelatinous exudate. Involvement of the lower respiratory tract resulting in "airsacculitis" is also seen. In fact, the air sacs are the most frequent sites of infection. Infectious sinusitis is of greatest economic importance in the United States and Canada but is also known to exist in Australia and Great Britain.

## HISTORY

Infectious sinusitis has no doubt been somewhat of a problem as long as turkeys have been raised in the United States. As the turkey flocks have become larger the morbidity and mortality rates have increased manifold.

The disease was probably recognized in England before the turn of the century. It was described in the United States in 1926, and was given the name "infectious sinusitis" in 1938 to differentiate it from a similar condition that had been found in turkeys owing to hypovitaminosis A.

In mature birds, the death loss is seldom as great as with some of the other acute diseases, but the economic loss may be many times greater. The necessity for the breeder to discard a flock that has reached production age is always a major economic concern. Poor hatchability with inferior poults as a result of the disease is the concern and responsibility of the breeder and the hatchery. The grower is concerned about poor feed conversion, increased mortality of poults, and the increased number of culls that result from infectious sinusitis.

The initiation of the mandatory inspection for poultry in 1959 proved to the entire turkey industry that infectious sinusitis could not be tolerated. Although it was evident that infectious sinusitis was not the only cause for condemnations because of airsacculitis, a few precursory surveys showed that it was an important one. Losses by death before the time of slaughter had been numerous. Control of infectious sinusitis with possible eradication became an essential for the industry to continue in competition with the other phases of meat production.

## ETIOLOGY

A pleuropneumonia-like organism known as Mycoplasma gallisepticum is generally accepted as the causative agent of the sinusitis and airsacculitis associated with this disease. The organism is similar if not identical to the one associated with chronic respiratory disease in chickens. Mycoplasma are small gram-negative organisms with very fastidious growth requirements and, because they have no cell walls, are easily destroyed outside the host by drying and by disinfectants (fig. 1).



Figure 1.--Mycoplasma spp. colony growth. X50.

## TRANSMISSION

Mycoplasma gallisepticum must be present in order to produce the disease known as infectious sinusitis. Other infectious agents, metabolic conditions, and mechanical agents may produce similar symptoms but not the specific disease discussed here.

Infectious sinusitis is produced in natural outbreaks in one or several of the following ways:

- Transmission from hen to poult through the egg.
- Transmission through the air. The distance the disease can be carried in this way is not known but is probably dependent on the intensity of the prevailing winds and the amount of debris in the air.
- Turkeys of any age may become infected by contact with infected turkeys, chickens, and other species of birds. The carrier birds do not necessarily exhibit disease symptoms, but can infect healthy susceptible turkeys. Two forms of this disease are commonly seen, the sinusitis form, from which the disease gets its name, and the air-sac or lower respiratory form, usually referred to as "airsacculitis."
- Mechanical carriers such as caretakers and visitors may carry the disease on their clothes and shoes. Contaminated processing-plant trucks and feed trucks are also means of transmission.



### Infectious Sinusitis

Sinusitis is usually first manifested by the birds shaking their heads in an attempt to remove the mucous exudate from their nostrils. The feathers become soiled and sticky from the combination of exudate, dust, and litter that adheres to the feathers. Watery secretions commonly appear from the eyes. The most dramatic sign is the swelling of the infraorbital sinuses. When sinusitis is present it is usually possible to squeeze a tenacious sticky, gray exudate from the nostrils or through the palatine tissue on the roof of the mouth. The swelling of the sinuses may continue to enlarge until the eyes either partially or completely close (fig. 2). The open-mouth breathing may be a result of a complete blocking of the posterior nares or a result of severe air-sac involvement, or both. Birds caught and held with the head down may die suddenly from lack of air caused by a tracheal blockage with mucous exudate. The affected turkeys continue to eat as long as they can see to find the feed, but become thin and depressed.

### Airsacculitis

Heavy breathing, coughing, and sneezing are common symptoms of the lower respiratory form. As the disease progresses, the breathing becomes noisier. There may be rattling respiratory rales, and panting may occur also. The head may become cyanotic (blue) from lack of oxygen. Inflammation of lung areas along with thickened and cloudy air sacs filled with a semi-gelatinous foamy exudate (fig. 3) that later becomes cheesy (fig. 4) are manifestations of air-sac involvement.



Figure 2.--Pronounced swelling of the face of a turkey with infectious sinusitis.

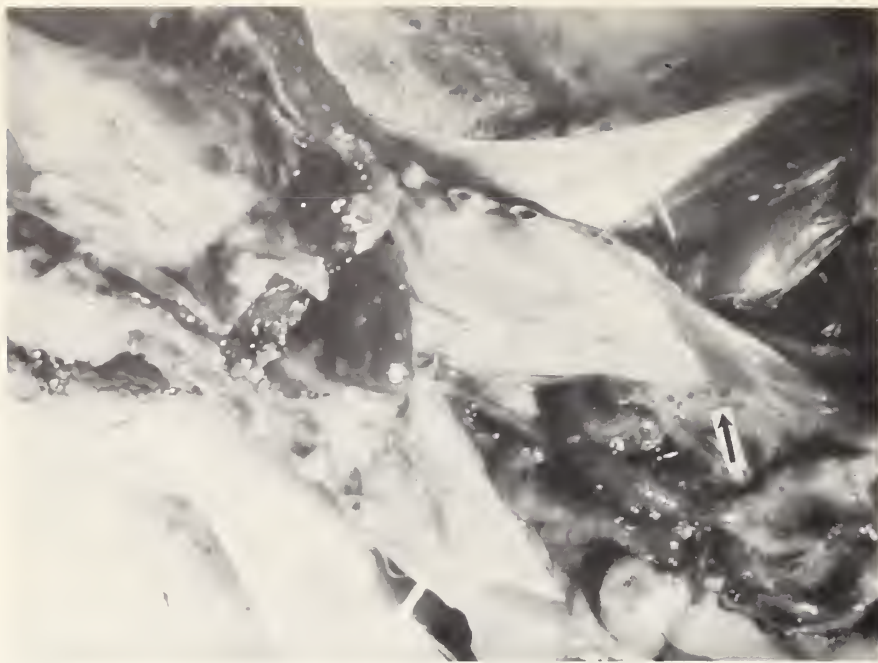


Figure 3.--Acute airsacculitis showing foamy exudate in abdominal air sacs of a turkey.



Figure 4.--Chronic airsacculitis showing solidified or cheesy exudate in thoracic air sacs of a turkey.



## DIFFERENTIAL DIAGNOSIS

Since there are several causes for clinical sinusitis and numerous causes, both known and unknown, for airsacculitis, it is vitally important that the presence or absence of Mycoplasma gallisepticum in turkey flocks be positively established. At the present time, the specific methods for diagnosing M. gallisepticum are: (1) Blood tests, (2) inoculation of birds and eggs with sinus exudate and/or air-sac material, and (3) culturing and identifying the organism in artificial media. The blood tests are rapid and relatively accurate; the other procedures take 2 weeks or more to complete. Definite diagnosis must be made at a well-equipped laboratory by trained personnel.

### Infectious Sinusitis

The symptoms of infectious sinusitis must be distinguished from similar ones caused by (1) Vitamin A deficiency, which may produce swollen sinuses; (2) a foreign body that has become lodged in the sinus and caused swelling (This is seldom bilateral; however, carelessness and improper sanitation at the time of debeaking may predispose to infections involving the sinuses.); and (3) an acute outbreak of ornithosis, which may produce a transitory swelling of the sinuses that may be confused at the onset with infectious sinusitis.

### Airsacculitis

Coliform infection (Escherichia coli); fowl cholera (Pasteurella multocida); aspergillosis (Aspergillus fumigatus); the virus causing Newcastle disease; and the ornithosis virus are some of the known agents that will produce this pathological entity. Unidentified mycoplasma organisms, not yet fully characterized, may cause airsacculitis that must be differentiated from that produced by M. gallisepticum.

## IDIOPATHIC AIRSACCULITIS IN DAY-OLD POULTS

Air-sac lesions are frequently found in very young poults. Today, when a representative number is examined it is almost impossible to find a hatch of day-old poults that is free of these lesions. Many times when a necropsy is performed on day-old poults and these lesions are found, a diagnosis of airsacculitis is made. Sometimes the breeder source and the hatchery are incriminated because the owner assumes the lesions are due to the M. gallisepticum organism. Usually the dams of the poults, and other poults of the same lot, never show clinical symptoms of infectious sinusitis and remain serologically negative to M. gallisepticum antigen.

Since these air-sac lesions are rather constantly found in day-old poults, it is possible that the infection could be highly egg transmitted. Research workers at many experiment stations are working on this problem but, owing to the many obstacles, the cause of the problem remains a mystery. A reliable veterinary diagnosis should be made before the infectious sinusitis organism (M. gallisepticum) is incriminated as the cause of this condition.

## SEROLOGICAL TESTS

Serological or blood tests are valuable tools for diagnosing M. gallisepticum infection in turkeys or determining past or present infection in breeder flocks. Blood tests in conjunction with good management and good sanitation practices are in many States the basis for a program to control and eradicate infectious sinusitis and airsacculitis caused by M. gallisepticum.

The most common serological tests used at the present time are the serum plate agglutination, the tube agglutination, and hemagglutination inhibition (HI) tests. There seems to be little difference between the value of the serum plate and the tube tests. The HI test is possibly more specific but is more difficult to apply and is used mainly to confirm the results of the other two tests.

In the use of the plate agglutination test, serum is mixed with a heavy suspension of M. gallisepticum organism (the antigen) on a glass or porcelain plate and observed for agglutination after a specific length of time. If there is a clumping of the antigen it indicates that antibodies are present and the birds either have the disease or have had it in the past. This is called a positive reaction. In the case of a negative reaction, the consistency of the mixture remains unchanged. In the tube test, serum is added to antigen in a test tube. When a positive reaction occurs, the M. gallisepticum antigen settles to the bottom, leaving the liquid clear. If no antibodies are present, the material remains cloudy and it is a negative test.

Antibodies in the serum prevent agglutination of red blood cells (hemagglutination) in the case of the hemagglutination inhibition test.

These blood tests will detect antibodies produced by turkeys in response to M. gallisepticum organisms. Blood testing does not locate all the infected individuals; however, it will detect infected flocks. These flocks should be discarded as breeders. It should be kept in mind, as in the case of all other tests, that a positive serological reactor shows the status of the flock at the time of the test only, not assuring that the flock will remain negative throughout its production period.

## TREATMENT

### Sinusitis

When a flock of breeder turkeys becomes infected with M. gallisepticum, the entire flock should be discarded as a source of eggs. Any unhatched eggs in incubators should likewise be eliminated. The chance of egg transmission of the disease to the poults originating from infected flocks is almost certain. This is true even if only a few birds of the flock show clinical signs or become positive to the blood test. If a grower flock, or a discarded breeder flock waiting for slaughter, is to be treated for infection, it must be done early if heavy economic loss is to be prevented. Financial losses from loss of weight and, particularly, from condemnations can be extremely high from this disease. The proper drugs<sup>1</sup> at correct levels are quite effective in reducing the severity of the symptoms and in minimizing the spread of the disease. Treatment must be based on an accurate diagnosis and the proper dosage of the

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<sup>1</sup> The mention of specific products in this paper is not to be construed as endorsement by the U.S. Department of Agriculture.

drug of choice. Reckless usage of drugs not only is a useless financial loss to the owner but may lead to the development of drug-resistant strains of the organism.

No drug will eliminate all of the M. gallisepticum infection, but several have proved effective against both the sinus form and the airsacculitis manifestation of the disease. The swollen sinuses must be treated before any treatment will be effective against the lower respiratory form.

Two older drugs for treating sinusitis are Argyrol and silver nitrate. The birds should be treated early while the exudate in the sinuses is a semiliquid, and both sinuses should be treated even though only one is affected. These solutions should be made up fresh each time they are used. The Argyrol solution is used at the concentration of 15 percent while silver nitrate is used at 4 percent. Two syringes (5 or 10 cc.), and a hypodermic needle about 1 1/2 inches long and about 16 gage are used. Insert the needle into the sinus and withdraw the sinus exudate into the attached syringe. Leave the needle inserted in the sinus and dispose of the exudate into a container of disinfectant. Attach the other syringe containing the solution to be used and inject 1 cc. into the sinus. The sinus may then be gently massaged to distribute the solution. Larger amounts than 1 cc. may cause very severe swelling and cause excessive tissue damage.

Antibiotics have been found to be effective in alleviating the symptoms of infectious sinusitis. These drugs must also be injected into the sinuses to be of benefit. However, the sinus exudate need not be removed when the antibiotics are used. A 25-mg. dose of streptomycin into each sinus has proved effective. Oxytetracycline, erythromycin, or chlortetracycline injected at the dose rate of 10 mg. per sinus has been of value. Furazolidone (NF 180) has also been used. Experimentally, tylosin has proved effective; the injection is made subcutaneously and dorsally on the head with the dosage recommended, into each sinus in this case. There has been no evidence that any of these drugs completely eliminate the organism from the respiratory system of the birds or prevented egg transmission.

### Airsacculitis

Airsacculitis caused by M. gallisepticum is not eliminated by treatment. Chlortetracycline, erythromycin, oxytetracycline, and tylosin have proved to be of value in alleviating the respiratory symptoms and slowing down the spread of the disease. Treatment has been helpful in aiding the body defenses of the bird to "wall off" or bring the exudate in the air sacs under control so the birds may be marketed with a reduced financial loss to the owner.

Continuous drug medication in the feed or water at the maximum levels allowed for almost a week is the usual method employed. The water treatment is probably the one of choice when the birds are in the acute state of the disease since many times they will drink but not eat. A minimum of 3 weeks should be allowed for the organization and absorption of the inflammatory exudate. Treatment as early as possible in the course of the disease cannot be overemphasized. It must be reemphasized that treatment at its best can only lessen the severity of the M. gallisepticum infection, and reduce the economic loss to the grower. The decision to treat should always be dependent on whether the cost of the drugs would or would not be greater than the benefits obtained. This decision must be made by the owner guided by professional advice.

In early outbreaks of infection in grower flocks, blood testing at intervals during the growing period is helpful to determine the status of the titer. Reduced or receding titers should indicate a recession of the infection. When there is any question it is advisable to market a sample of the flock to determine the severity of the air-sac lesions and judge the time for marketing the flock accordingly.



## CONTROL PROGRAM IN BREEDER TURKEYS

There is good evidence that infectious sinusitis, caused by Mycoplasma gallisepticum, can be controlled and eventually eradicated. A successful control program will require the use of professional veterinary counsel and supervision along with the diagnostic tests. Careful observation of the breeder birds before and at the time the selection is made, as well as during the laying period, will be of utmost importance. Good flock-management practices will always be essential if the program is to be carried out properly.

Sometimes it is desirable to conduct a preselection sample test of the flock from which future breeders are to be selected. This is particularly true if there has been a history of any respiratory disease in the flock during the growing period, or if there has been disease on the farm in preceding flocks. The M. gallisepticum test should be from a random sample of all segments of the flock and should be at least 100 samples. The birds must be 10 weeks old or older when the samples are taken. If several or any one of the birds shows positive titers and/or clinical symptoms, breeders should not be selected from the flock.

Because a small number of infected birds in a flock of breeders can later be the cause of a serious and costly outbreak of infectious sinusitis, a 100 percent test of the flock at the time the pullorum test is made is generally accepted as the ideal procedure, wherein some of the blood collected from each bird for that test is used. In some States, a percentage of the samples are tested at random at the time the pullorum test is run; however, this method leaves the possibility of missing reactors if the percentage of infection in the flock is low.

Experience has shown that the elimination of reactors to save the balance of the flock is not successful. The entire flock should be discarded as breeders if reactors are present. If clinical symptoms of a respiratory nature occur at any time after the breeder flock has been selected and tested, a random sample should be taken from the affected birds and tested for M. gallisepticum.

## SUGGESTIONS FOR SANITATION AND MANAGEMENT PRACTICES

### In Breeder Flocks

- Maintain breeder flocks on farms separate from grower flocks.
- Avoid the introduction of new breeding stock unless the birds can be adequately segregated for 30 days or until proved to be free of Mycoplasma organisms.
- Prevent transmission from outside sources by indirect contact through contaminated equipment, footwear, clothing, and vehicles.
- Provide adequate isolation for breeder flocks to avoid air-borne transmission from other flocks.
- Minimize contact of breeder flock with game and free-flying birds.
- Eliminate chickens and other fowl from breeder farm.
- Keep the rodent population and other pests under control.
- Initiate a vaccination program for other poultry diseases aimed at the needs of the farm and area.

- Allow no visitors to turkey houses or range premises.
- Clean and disinfect all equipment after each use.
- Maintain a footbath with an approved disinfectant.
- Clean and disinfect confinement house or pole barn between flocks.
- Use clean and well-drained areas for range.
- Use clean dry litter free of mold.
- Keep accurate records of death losses.
- Dispose of all dead birds properly and promptly.
- Seek services of a veterinary diagnostician if abnormal losses or signs of disease occur.

### In Market Flocks

- Clean and disinfect brooding equipment and buildings between each group.
- Obtain day-old poults from breeder flocks free of infectious sinusitis (M. gallisepticum).
- Separate age groups as completely as possible during brooding and growing periods.
- Prevent contact with chickens, game birds, and other fowl.
- Prevent introduction of infection from outside sources through contaminated equipment, footwear, clothing, and vehicles.
- Allow no visitors to turkey houses or range premises.
- Maintain a footbath with an approved disinfectant.
- Keep the rodent population and other pests under control.
- Dispose of all dead birds properly and promptly.
- Use clean and well-drained areas for range.
- Keep accurate mortality and medication records.
- Provide for a break in population each year of at least 2 to 4 weeks for a complete cleanup of equipment, premises, and buildings.
- Seek services of a veterinary diagnostician if abnormal losses or signs of disease occur.

It is reasonable to believe that continuing research will provide better diagnostic methods and more information concerning the control of this costly and difficult disease problem. However, with the present knowledge and the use of the available tests, those growers who follow a sound management program as outlined in this publication are in a position to control and probably eradicate it from their turkey flocks.



